

Land-labourer Relationship and Effect on the Working Efficiency: Anthropometry and Health Traits of the Oraon Agricultural Workers of Jalpaiguri District of West Bengal

Subrata K. Roy and Baidyanath Pal

*Anthropology and Human Genetics Unit, Indian Statistical Institute, 203, B.T. Road, Calcutta 700 035, India
e-mail: rsubrata@isical.ac.in*

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ABSTRACT The aspect of worker productivity or efficiency of work is one of the interesting problems in the third world countries especially in the Indian context. The work productivity or efficiency of work depends on several factors including health and socio-cultural factors. In the present article, three agrarian Oraon worker groups (landowner, sharecropper and daily labourer) have been considered in order to see the differences in work output and to find out the possible causes of such differences. The measurement of work output in harvesting (stocks), used for the present purpose is supposed to be the only possible way, and some explanations have been given in favour of the measurement. Results of the present study show that there are differences in work output between/ among agrarian worker groups but the differences are not statistically significant. The differences in work output may not clearly be attributed to the differences in anthropometric traits or other health traits. Possible explanations have been sorted out in the light of socio-cultural values e.g. attitude and motivation of the workers.

INTRODUCTION

Nations which produce most of their food by human labour require a high percentage of populations to produce food to subsist. In India, about 67.7 per cent people are engaged in agricultural occupations and primarily depend on agriculture (Stout and Downing, 1979). Both males and females are engaged in the agricultural sector and constitute an important proportion of the total labour force in most of the states in India. However, a large majority of the individuals, who are engaged in the agricultural occupation, do not have any cultivable land of their own. Some of them are engaged as daily labourer and few of them share land of other landowners. Therefore, generally three categories of workers are found in the agricultural scenario of India i.e. Landowner, Sharecropper and Daily labourer. Now let us clarify the terms little elaborately.

Landowner: The land one cultivates is in the possession of his/her own household. There is full control over the land in terms of inheritance, sale, and lease. Generally, the landowner groups have interests to improve the fertility of the land (District Census Handbook, 1991).

Sharecropper: As the term denotes, one who is sharing the land of a landholder or of those who have no time for cultivation (engaged in other jobs). The sharecroppers have no control over the land in terms of possession, inheritance and sale. They only cultivate the land on their own and pay one third of the produced crops to land owners. Generally, sharecroppers have very little interests in improving the land for better crop production. Although sharecropping exists in other Indian states, may be in different forms, therefore, it is worth mentioning a little about the origin of sharecropper in West Bengal.

In Bengal (presently West Bengal and Bangladesh), during post independence, there emerged a class of gentleman (not peasant) landowners. This comprised Brahmins, kayasthas, other upper caste people, pleaders, judges, magistrates, doctors and so on. These people purchased land rights and threw up such lands into sharecropping cultivation since that provided a safe and profitable investment of their savings and this process started after great Bengal famines. The spread of sharecropping was also due to several other factors. 1) with the destruction of indigenous manufacturing, a vast majority of population was thrown back into agriculture and had to rely on sharecropping cultivation for survival. 2) with the diminution of the land holdings due to the operation of inheritance laws, many peasants started depending on sharecropping cultivation to supplement their income. 3) the gentlemen would not involve themselves in

actual cultivation since in terms of the prevailing socio-cultural milieu, this would erode their social status. 4) the growth of sharecropping cultivation owed to the creation of urban job opportunities for more educated middle class landholding families (Bhoumik, 1993).

Daily Labourer: They are land less (either they have very little plots of land which is not sufficient to earn the livelihood or they have only land for making house) labourer. They usually work in the land of others in lieu of cash (money) or kind. So their livelihood is fully dependent on wage. The wage is not fixed in many areas of the country and primarily depends on the skill and performance and /or work output of the individual (District Census Handbook, 1991).

In the present article the terms productivity and work productivity have been used synonymously, although work is a complex entity and involves components, in addition to the biological one, such as psychological factors, type of work and work setting. The pursuit of productivity is of course the common interest of all the people, especially those who are associated with labour intensive jobs. Productivity is an index of production efficiency and defined differently by different people. However, productivity may be defined in terms of some quantitative measures of physical performance in actual work situations. Specifically, in some types of industrial and agricultural work, payment is based on piece work and productivity can be measured in terms of manufactured or harvested goods or pay received (Spurr, 1983). In general, it is taken as the concept that indicates the efficiency of input as compared with output.

Physical activity is an integral and complex component of human behaviour, which comprises also of socioeconomic and cultural components (Andersen et al., 1978). On the other hand, physical activity or capacity for work is influenced by many factors, for instance, biological (e.g., age, sex, body dimensions, etc.), psychic (e.g., attitude and motivation, etc.), environmental (e.g. altitude, barometric pressure, heat, cold, noise, air pollution etc.), nature of work (e.g., intensity, duration, rhythm, technique, position, etc.), and training and adaptation (Astrand, 1977). Following from this, it appears that physical activity is related to physi-

cal, mental and social well being of an individual, which is termed simply as health (WHO, 1971).

However, a few indicators of body dimensions have been found to have important relationships with productivity. Nutritional status affects body weight and eventually physical working capacity (Buzina et al., 1982). In Jamaica, Heywood (1974) finds weight-for-height to significantly affect productivity. Basta et al. (1973) find no relationship of weight and height with work productivity among Indonesian road construction workers. Studies in Guatemala show (Immink, 1978) a positive relationship of height with productivity. The fat free mass of Guatemalan wage labourers is shown to correlate with the amount of coffee beans picked per day. Malville (1999) finds non-significant correlation between load with body height and weight. In India, Satyanarayana et al. (1977) found a positive relationship between work output and body size. Sukhatme (1982) fails to find any relationship between body weight and work output of women. The review of literature show contrasting findings but it is intuitively believed and understood that there may have some relationships between/ among anthropometric traits, health traits with work output of an individual.

Very little information is known regarding the relationship of the three categories of agricultural workers and differences in work output. A few literatures in the subject of economics have dealt with the economic aspect of crop production (yield) and have shown the differences between the two groups, i.e. sharecropper and landowner (Chattopadhyay, 1979; Chadha and Bhaumik, 1992). However it is intuitively understood that there may have some differences between/among the three agrarian worker groups which may be due to (1) agrarian relationship between/ among categories of agricultural workers, (2) attitude and motivation towards agricultural work, which ultimately affect their health and work output. In view of the above, present study was undertaken among the Oraon agricultural worker groups of Jalpaiguri district, Northern West Bengal.

The objective of the present article is to explore the differences in work output between/ among three agrarian worker groups. If differences exist at all in the work output, then,

possible answers have been looked into the i) comparison between/among groups in anthropometric traits, (ii) comparison between/among groups in health traits.

MATERIAL AND METHODS

A total of 197 Oraon agricultural labourers/workers were investigated out of which 113 were male and 84 were female, and all of them were selected from Rangali Bazna Anchal of Madarihat Police Station, Jalpaiguri district, West Bengal.

The Oraons are a Dravidian-speaking tribal population with its major concentration in the Chotanagpur plateau in Bihar. They are believed to have migrated to northern West Bengal from Bihar about the end of the last century (Choudhury, 1978). The Oraon population has inhabited this area for a long time, practising their traditional occupation, although sizable propor-

tions of the Oraons are working as tea garden labourers. The subjects for the present study were all adults, aged between 20 and 60 years and engaged in the occupation since last 10 years.

Anthropometric measurements were done using standard methodology and standard instruments (Weiner and Lourie, 1981). A single investigator took all anthropometric measurements. Height, weight and skinfold thickness measurements have been used in the present article because most other anthropometric measurements were tested and seems to be relatively less related with work productivity (Roy, 2000). Total body fat (kg) was estimated using (Sen and Banerjee, 1958) the following formula: $\text{Fat\%} = 4.201 / D - 3.813 \times 100$, and $D = 1.0890 - (0.0028 \times \text{Triiceps skinfold thickness})$.

Strength is basic to performance and it is a measure of physical fitness. Strength tests are one of the most practical measures to evaluate

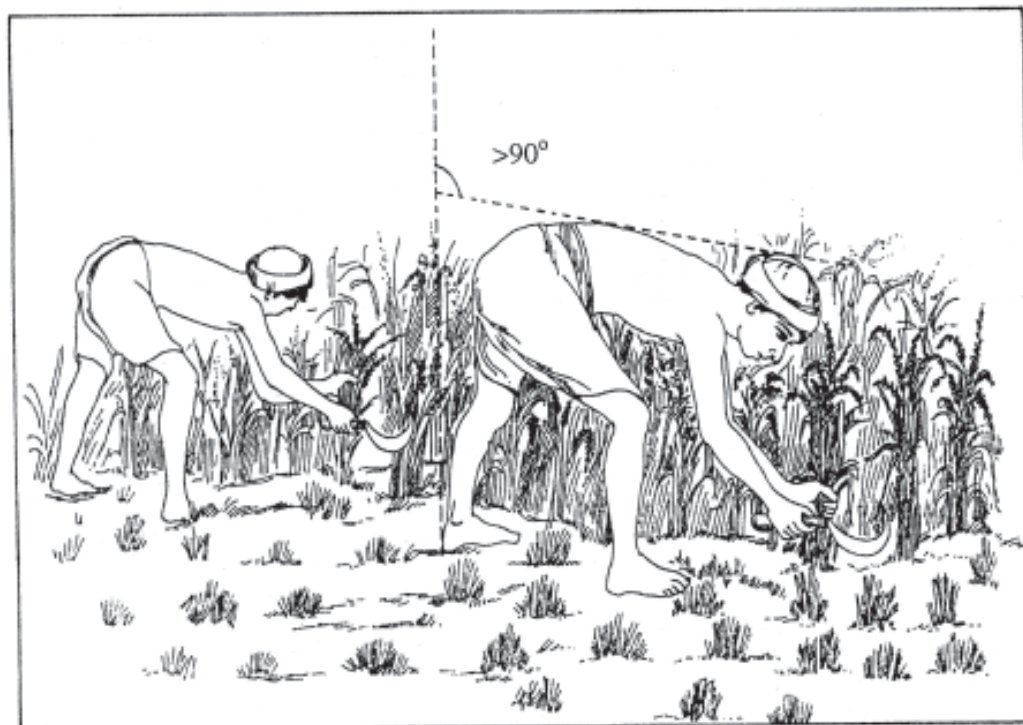


Fig. 1. Sketch showing harvesting of rice in the paddy (rice) field

fitness. Strength data for handgrip strength and back strength were collected through battery operated automatic handgrip dynamometer and back dynamometer, using standard test protocols (Mathews, 1973).

Systolic (SBP) and diastolic (DBP) blood pressure measurements were measured after a 15 minutes rest period, in a sitting position, on the upper arm by the auscultatory method using an inflatable calf and mercury sphygmomanometer. SBP was determined at the point when the Korotkoff sound completely ceased (Rose, 1980), and pulse rate (PR) was also measured.

Rice (*Oryza sativa*) is the principal staple diet of most of the Indian population and two third of the total Indian population is engaged in the cultivation of rice (paddy). There are several activities in the cultivation of rice e.g. tilling and leveling the soil, transplantation, weeding and harvesting. The output of harvesting is relatively easy to measure than other activities and was used for the present purpose. The harvesting of rice (paddy) is done manually and individuals of both sexes are engaged in harvesting. Differences of harvesting output may be observed between sexes and ages, therefore, the rate of wage per day is different either by sex and/or age. Variation within sexes also depends on the type of land, which has not been considered in the present study. The output data on harvesting used in the present study, were collected through counting the number of "bunch of stocks" of rice paddy each individual harvests per hour. Because (1) there was no known alternative methods to measure the harvesting except the amount and rate of clearing the land, (2) the present technique of measuring actual harvesting output seems to be easy and simple in operation. One can easily calculate the amount and rate of clearing the land from the present harvesting data, because the distances between one "bunch of stocks" to another "bunch of stocks" are approximately 6-8 inches.

Let us clarify the method of rice harvesting a little more elaborately, because of the non-universality of the method. Rice paddy is always harvested by human labour in India. The rice crop is generally cut with a sickle. The sickle is traditional and perhaps the original

harvesting implement is still widely used, although the shape varies in different regions of the country, but it is essentially the same, being the familiar shape and usually having serrated self-sharpening cutting edge and a wooden handle for gripping. Generally the harvester bends the waist at an angle of more than 90° with both hands extending downwards to reach the cutting position (the rice crop is cut with a little long straw in view of the usefulness of the straw) of the plant (the rice plants are 3-4 feet tall depending on the species type). The harvester grips all the stems (bunch of stocks) popular agricultural connotation being "hill" (stocks grown at single transplanted point) of the rice plant together with left hand and draws the blade of the sickle below the grip with right hand, and this process continues. It is worth noting that during transplantation 3-4 seedlings of rice plant are thrust into the mud (single hill) with great speed and precision maintaining uniform rows and columns and it is primarily the job of the females. At maturity, those 3-4 seedlings of rice plant make several branches with several stocks of rice paddy, which appears to be like a bush, and this bush has been described as "bunch of stocks" and counted for the present study as harvesting output.

Initially the attempt was made to study all the worker individuals of the study area but all the workers were not available due to time constraints. The subjects who volunteered themselves and could be persuaded to participate in the study were taken in the sample. No subjects were included in the sample with any conscious bias. The categories of workers were classified at the time of data analysis. The landowner and sharecropper individuals included in the present study, are basically marginal farmers. They have very small land holdings, which is not sufficient to earn their livelihood throughout the year. Therefore, sometimes they work as daily labourer in others land.

One way analysis of variance is performed to test the equality of means between the groups, instead of computing a number of t-tests between/among groups. It also tests the null hypothesis that several group means are equal in the population, by comparing the sample

variance estimates from the group means to that estimated within the groups.

RESULTS

Table 1 shows the group wise descriptive statistics of different variables between/among agrarian worker (peasant) groups. Male share-cropper group shows highest mean value in age and triceps skinfold thickness. Male landowner shows highest mean values in weight, diastolic blood pressure, systolic blood pressure, biceps skinfold thickness, body mass index (BMI) and total fat. Male daily labour group shows highest mean values in height, grip strength both left and right and stock (work output). Considering female groups on the other hand, it is observed that the sharecropper groups show higher mean values in age, height, and both systolic and diastolic blood pressure. Landowner groups show higher mean values in weight, biceps skinfold thickness. Daily labourer shows higher mean values in triceps skinfold thickness, body mass index (BMI) and stocks (work output).

Table 2 shows the results of one-way analysis of variance between/among groups with regard to different variables under study. Male groups show that there is no significant differences between/among worker group in any of the variables. Considering the female groups on the other hand, it is observed that there is no significant difference in any of the variables except the significant values in systolic blood pressure ($F=3.70$, $p=0.03$) and that is due to the differences between sharecropper and landowner groups ($t = 2.40$, $df = 56$).

DISCUSSION

The present article attempts to focus on the differences in health traits and its effect on the work output among the different agrarian groups of agricultural workers. All the subjects are to some extent similar in respect of ethnic origin, socio-economic condition, nutritional status and sharing the same habitat for a pretty long time. The test protocols used for the study are very much similar in all the subjects. Therefore, it is

Table 1: Descriptive statistics of the variables (Males)

Variables	Share Cropper			Land Owner			Daily Labourer		
	Mean	N	S.D.	Mean	N	S. D	Mean	N	S.D.
Age	34.97	32	12.83	33.59	44	13.51	30.27	37	10.75
Height	161.74	32	5.97	163.04	44	7.67	163.08	37	4.85
Weight	47.31	32	4.47	48.57	44	6.35	48.24	37	5.18
Diastolic B. P.	86.69	32	13.62	87.36	44	11.00	84.27	37	10.63
Systolic B. P.	131.25	32	21.13	134.14	44	22.94	128.84	37	15.18
Skinfold Biceps	3.13	32	0.56	3.22	44	0.60	3.19	37	0.50
Skinfold Triceps	5.23	32	1.33	5.07	44	1.28	5.04	37	1.36
Body Mass Index	18.08	32	1.34	18.22	44	1.54	18.11	37	1.43
Surface Area	1.54	32	0.09	1.56	44	0.13	1.56	37	0.10
Total Fat	4.61	32	0.78	4.68	44	1.13	4.61	37	0.89
Grip Strength(L)	31.08	32	4.96	32.08	44	7.45	33.49	37	7.26
Grip Strength@	30.55	32	5.31	32.14	44	7.89	33.11	37	6.74
Stocks	3606.94	32	1407.62	4035.98	44	1554.87	4344.22	37	1541.38

Descriptive statistics of the following variables (females)

Age	33.45	22	12.34	30.28	36	10.45	33.42	26	10.46
Height	151.84	22	5.96	150.93	36	5.61	149.53	26	5.91
Weight	40.09	22	3.90	40.33	36	3.50	40.02	26	5.24
Diastolic B. P.	89.45	22	17.54	83.28	36	13.97	88.15	26	14.70
Systolic B. P.	135.00	22	23.58	120.61	36	19.58	126.46	26	15.28
Skinfold Biceps	3.94	22	1.10	4.12	36	1.44	4.04	26	1.48
Skinfold Triceps	7.60	22	2.21	8.24	36	2.86	8.45	26	2.89
Body Mass Index	17.40	22	1.55	17.71	36	1.30	17.83	26	1.55
Surface Area	1.43	22	0.09	1.43	36	0.08	1.42	26	0.11
Total Fat	4.90	22	1.15	5.23	36	1.50	5.31	26	1.78
Grip Strength(L)	22.14	22	3.48	21.93	36	3.58	20.89	26	3.78
Grip Strength@	23.14	22	3.97	22.92	36	4.03	21.64	26	3.47
Stocks	2997.50	22	1086.66	2783.17	36	1116.30	3241.81	26	1178.60

Table 2: Oneway analysis of variance (Male)

<i>Variables</i>	<i>Male</i>	<i>Sum of Squares</i>	<i>df</i>	<i>Mean Square</i>	<i>F</i>	<i>Sig.</i>
Age	Between Groups	413.82	2	206.91	1.33	0.27
	Within Groups	17114.90	110	155.59		
	Total	17528.73	112			
Height	Between Groups	40.19	2	20.09	0.49	0.61
	Within Groups	4480.31	110	40.73		
	Total	4520.50	112			
Weight	Between Groups	30.24	2	15.12	0.50	0.61
	Within Groups	3319.48	110	30.18		
	Total	3349.73	112			
Diastolic B.P	Between Groups	204.78	2	102.39	0.75	0.47
	Within Groups	15020.35	110	136.55		
	Total	15225.13	112			
Systolic B.P	Between Groups	569.24	2	284.62	0.70	0.50
	Within Groups	44764.21	110	406.95		
	Total	45333.45	112			
Skinfold Biceps	Between Groups	0.13	2	0.07	0.21	0.81
	Within Groups	34.21	110	0.31		
	Total	34.34	112			
Skinfold Triceps	Between Groups	0.76	2	0.38	0.22	0.80
	Within Groups	192.27	110	1.75		
	Total	193.04	112			
Body Mass Index	Between Groups	0.44	2	0.22	0.10	0.90
	Within Groups	231.43	110	2.10		
	Total	231.87	112			
Surface Area	Between Groups	0.01	2	0.01	0.55	0.58
	Within Groups	1.35	110	0.01		
	Total	1.36	112			
Total Fat	Between Groups	0.13	2	0.07	0.07	0.93
	Within Groups	101.77	110	0.93		
	Total	101.90	112			
Grip Strength (Left)	Between Groups	101.49	2	50.75	1.11	0.33
	Within Groups	5048.50	110	45.90		
	Total	5149.99	112			
Grip Strength (Right)	Between Groups	113.51	2	56.75	1.20	0.30
	Within Groups	5186.70	110	47.15		
	Total	5300.21	112			
Stocks	Between Groups	9358006.15	2	4679003.08	2.05	0.13
	Within Groups	250911871.12	110	2281017.01		
	Total	260269877.27	112			

Oneway analysis of variance (Female)

<i>Variables</i>	<i>Female</i>	<i>Sum of Squares</i>	<i>df</i>	<i>Mean Square</i>	<i>F</i>	<i>Sig.</i>
Age	Between Groups	205.39	2	102.70	0.85	0.43
	Within Groups	9757.02	81	120.46		
	Total	9962.42	83			
Height	Between Groups	65.69	2	32.84	0.98	0.38
	Within Groups	2720.03	81	33.58		
	Total	2785.72	83			
Weight	Between Groups	1.69	2	0.84	0.05	0.95
	Within Groups	1434.56	81	17.71		
	Total	1436.25	83			
Diastolic B.P.	Between Groups	636.18	2	318.09	1.38	0.26
	Within Groups	18690.06	81	230.74		
	Total	19326.24	83			
Systolic B.P.	Between Groups	2829.94	2	1414.97	3.70	0.03
	Within Groups	30935.02	81	381.91		
	Total	33764.95	83			
Skinfold Biceps	Between Groups	0.45	2	0.22	0.12	0.89
	Within Groups	152.86	81	1.89		
	Total	153.31	83			

Table 2: Contd.....

Variables	Female	Sum of Squares	df	Mean Square	F	Sig.
Body Mass Index	Between Groups	9.20	2	4.60	0.62	0.54
	Within Groups	597.21	81	7.37		
	Total	606.41	83			
	Between Groups	2.30	2	1.15	0.55	0.58
	Within Groups	169.97	81	2.10		
	Total	172.27	83			
Surface Area	Between Groups	0.00	2	0.00	0.26	0.77
	Within Groups	0.72	81	0.01		
	Total	0.73	83			
Total Fat	Between Groups	2.18	2	1.09	0.47	0.62
	Within Groups	186.51	81	2.30		
	Total	188.69	83			
Grip Strength (L)	Between Groups	23.15	2	11.57	0.88	0.42
	Within Groups	1060.87	81	13.10		
	Total	1084.02	83			
Grip Strength (R)	Between Groups	33.82	2	16.91	1.14	0.32
	Within Groups	1201.47	81	14.83		
	Total	1235.29	83			
Stocks	Between Groups	3183489.70	2	1591744.85	1.25	0.29
	Within Groups	103139150.54	81	1273322.85		
	Total	106322640.24	83			

intuitively understood that there was no apparent difference between / among the subjects. However, the results of the present study reveals that there are differences between/ among agrarian groups in respect of several health parameters under study, although the differences are not significant in most of the traits. But in small anthropological studies trend is much more important rather than emphasizing on mere statistical significance.

There are differences between/ among agrarian worker groups in the mean values of work output (stocks), although the differences are not significant in either sex. However, the trend shows that daily labourer groups of either sex have the maximum work output than other two groups. Male landowner groups show higher output than sharecropper but females show bit contrasting results than males and that is perhaps due to low blood pressures of the land owning females. Mean values of blood pressure parameters show relatively small values in male daily labourer, and in female landowner groups, which seem to be a sign of better physical fitness than other groups. Mean values in respect of strength parameters, male daily labourer group shows the maximum strength and female daily labourer group shows the lowest strength, which also seems to be logical that male daily labourer groups have more strength and endurance for

giving sustained physical effort. The variation in work output between / among groups may be explained in the following ways— data shows two major trends e.g. aging (lowest in the male daily labourer group) and high blood pressure (male land owner group) which are affecting the work output in both sexes.

To our view, these explanations are not strong enough, and may be looked into the human behaviour, including the socio-cultural values of the groups. (1) Both landowners and sharecroppers are in a advantageous position than the daily labourer, because the labourer sells his labour in lieu of cash or kind. If a daily labourer does not work properly or does not give full effort, then the hirer has the full liberty to change the daily labourer next day. (2) The number of daily labourer is high than the demand in the area, because of the growing unemployment problem in the country. (3) It is also the survival strategy of the daily labourer group. Either live properly giving full effort to the work you have been assigned otherwise perish (you will not get any work in future). But in case of landowner the basic thing is timeliness, specifically in harvesting. If he/she does not harvest in proper time, then he/she will waste a lot amount of food grains in the paddy field. The case of sharecropper is to some extent different, there is no bothering to maintain timeliness, because the waste is

relatively less to sharecropper compared to the landholder. Generally, the sharecropper does not employ any daily labourer from outside because the wage will be deducted from his share.

Unfortunately, there are no published literatures especially in the Indian context in this regard. Therefore, no comparison can be made at present with any of the literatures in this regard. More systematic studies are necessary to explore the variations in different areas of the country and possible explanations can be sort out for the variations of the problem.

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